Research Potential of some Lebanese Universities

Paul Ghobril

Dean of the Faculty of Engineering

Antonine University - Lebanon

Koc University
June 4-6, 2012

NSF United-States/Middle-East Workshop On Trustworthiness in Emerging Distributed Systems and Networks

How to Locate Lebanon

and the Antonine University

Koc University
June 4-6, 2012

How is Lebanon Worldwide Connected

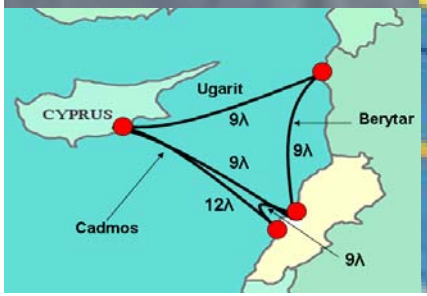
TICKET

Capacity per λ STM-64 (10GB) upgradable to 40 GB:

- 9λ: Berytar (Tripoli – Tartus) *1997 through Aletar (Alexandria – Tartus)*
- 12λ: Cadmos (Beirut – Pentaskhinos) *1995*

Capacity up to 3.84Tbs:

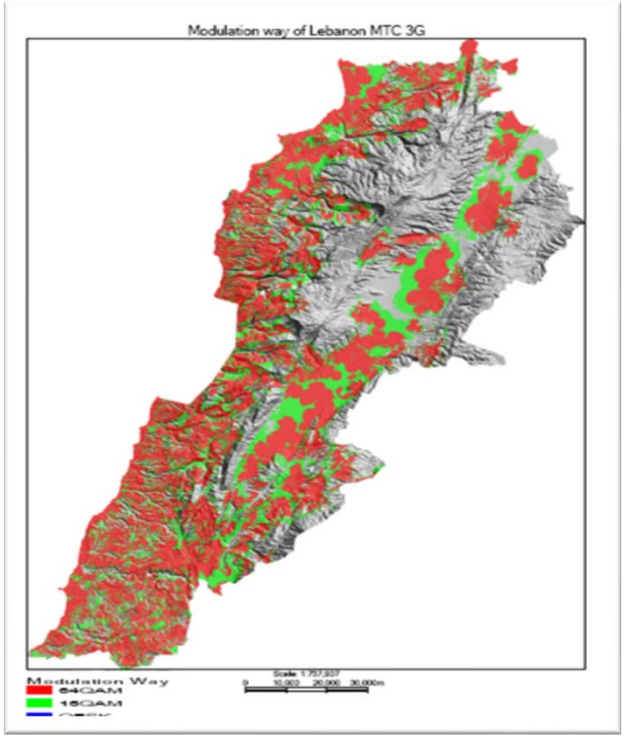
- 2x128λ: IMEWE (India-Middle East-Western Europe) *2010*



National Lebanese Networks

Optical Transport Network:
- 48 or 24 fibers on mesh segments
- Capacity calculation on a 24 fibers cable:100 Gbit/s per λ, 80 λ per fiber, 12 fiber pairs ➔ 96 Terabit/s (data+voice)

3G / 3.5G GSM Network:
- download speeds per cell up to 21 Mbit/s
- Upload speeds per cell up to 5.8 Mbit/s



TICKET Research Laboratory

•TICKET acronym stands for:

Telecommunications, Information and Computer Key Enabling Technologies

- Within the Faculty of Engineering of the Antonine University: TICKET research Laboratory
- Worldwide memorandum of understanding with industrial and academic institutions (Orange Labs Networks and Carrier, Sorbonne University, Burgundy University, Sherbrook University, Lyon University, Louvain University…)
- Research areas:
  - Optical Networks
  - Ad hoc Networks
  - Network and Information System Security, Cybersecurity
  - Image Processing and Watermarking
  - Multimedia Access Control and MediaCorpus Management
  - Microwave Circuits
  - Embedded Systems

Latest Research Projects

- Dynamic Optical Circuit Switching (DOCS) with Orange Labs Networks and Carrier
- Easy MediaCorpus Management with Burgundy University
- Watermarking with Louvain University
- Optical Signal Visualization with Envergus and Telecom ParisTech

TICKET

Latest Event

Keynote Speakers:

- **Marco Ajmone Marsan** – Politecnico di Torino, Italy ***TREND, the FP7 Network of Excellence on Green Networking***.

- **Lanfranco Marasso** – Engineering Ingegneria Informatica spa, Italy ***Green Computing***.

RELABIRA'2012
3rd International Symposium
on Broadband Networks and Fast Internet

May 28-29, 2012
Antonine University
Baabda, Lebanon

Université Antonine
الجامعة الأنطونية

IEEE

IEEE COMMUNICATIONS SOCIETY
Lebanon Chapter

CNRS 50 1962-2012
National Council for Scientific Research

Ministère des Télécoms
وزارة الاتصالات

orange

UNIVERSITÉ DE RENNES 1

Koc University
June 4-6, 2012

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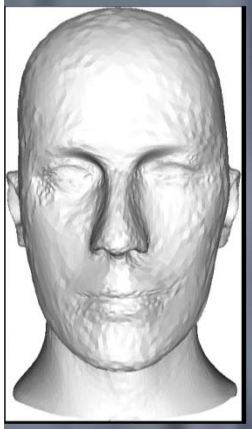
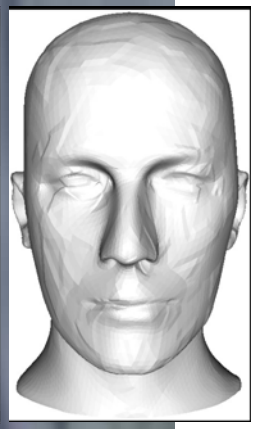
Copyright Protection, Counterfeiting Preventing and Steganography

Antonine University
Rony Darazi

Lebanese University
Bacem Bakhache





- Secure watermarking scheme based on Spread Transform Dither Modulation (STDM) method for Digital Cinema. The embedding is performed in the JPEG2000 decoding pipeline after the de-quantization and prior to the inverse discrete wavelet transform (IDWT). We exploit the wavelet properties related to the Human Visual System (HVS) in order to have a trade-off between Fidelity and Robustness, while preserving Security.
- A 3D-mesh watermarking method to protect intellectual property rights of 3D objects: The watermarking occurs in the spherical coordinates system, where only the vertex norm of each point is modified.
- Physical Object Watermarking to prevent counterfeiting. Random variations that appear on the profile of the physical objects can be exploited to prevent their cloning.
- Steganography is the art and science of writing hidden messages in such a way that no one, apart from the sender and intended recipient, suspects the existence of the message. Although transform domain based algorithms are more robust to steganalytic attacks, the spatial domain based algorithms are much simpler and faster. We aim to achieve a system based on chaotic sequences that conceal as much information in digital media with minimum visual degradation (of media in use).

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Network and System Security

Antonine University — Jacques Demerjian

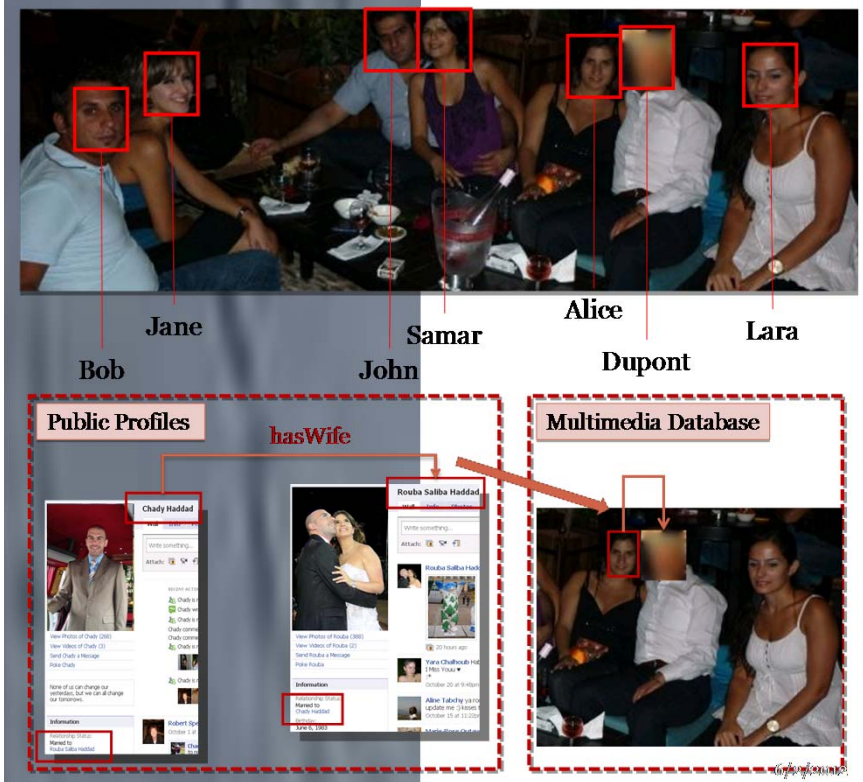
Notre Dame University — Hoda Maalouf and Marie Khair

- New approach for the generation of certificates to contribute to the authorization services, then to integrate this contribution to DHCP in order to reinforce it. We defined the specification and the implementation of an extension to DHCP, called E-DHCP presenting a method of authentication of DHCP entities (client and server) and of DHCP messages contents.

- Availability, integrity, and confidentiality in distributed and grid systems: replication techniques lack the third factor, that of confidentiality of data. Without it, replicas are prone to malicious attacks and sensitive data can be disclosed. We proposes to combine all these 3 factors into one replication algorithm, the DRG model, based on the trust ranking of nodes. Data is replicated on the diagonal ranging from mostly secure nodes to averagely secure ones. The possibilities of all malicious actions (illegal access, change or deletion) for a certain file are minimized, therefore guarantying a more secure replication of databases on the grid.

Direct and Indirect Access Control to Multimedia Objects

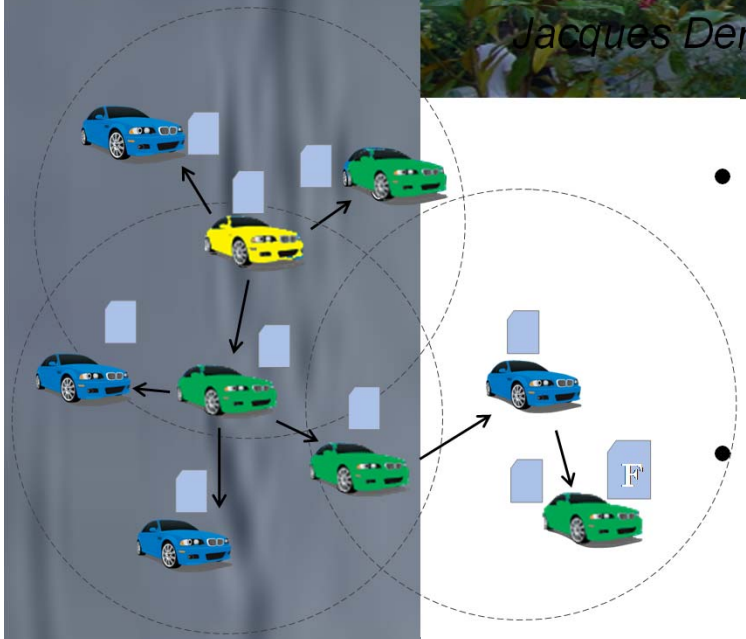
Antonine University
Bechara Al Bouna



- We defined a multimedia access control model based on multimedia authorizations. Using such authorizations, multimedia objects are specified using their textual description as well as their raw data.
- We elaborated an inference detection technique using social networks in order to eliminate the risk of revealing confidential multimedia objects through inference channels.

Wireless Sensor Network and its Security

Antonine University Balamand University Lebanese University
Talar Atechian and Jacques Demerjian *Gilbert Habib* *Bacem Bakhache*



- AdHoc Network Routing and QoS in Vanet Networks: Multimedia Data Exchange on AdHoc Networks
- The security protocols in AdHoc Networks while respecting the real-time requirement of industrial control: Chaotic systems are able to produce stream cipher with high randomicity, which looks like stochastic noise. Based on chaotic maps, a high speed chaotic cryptographic scheme is proposed. It requires a little memory capacity.